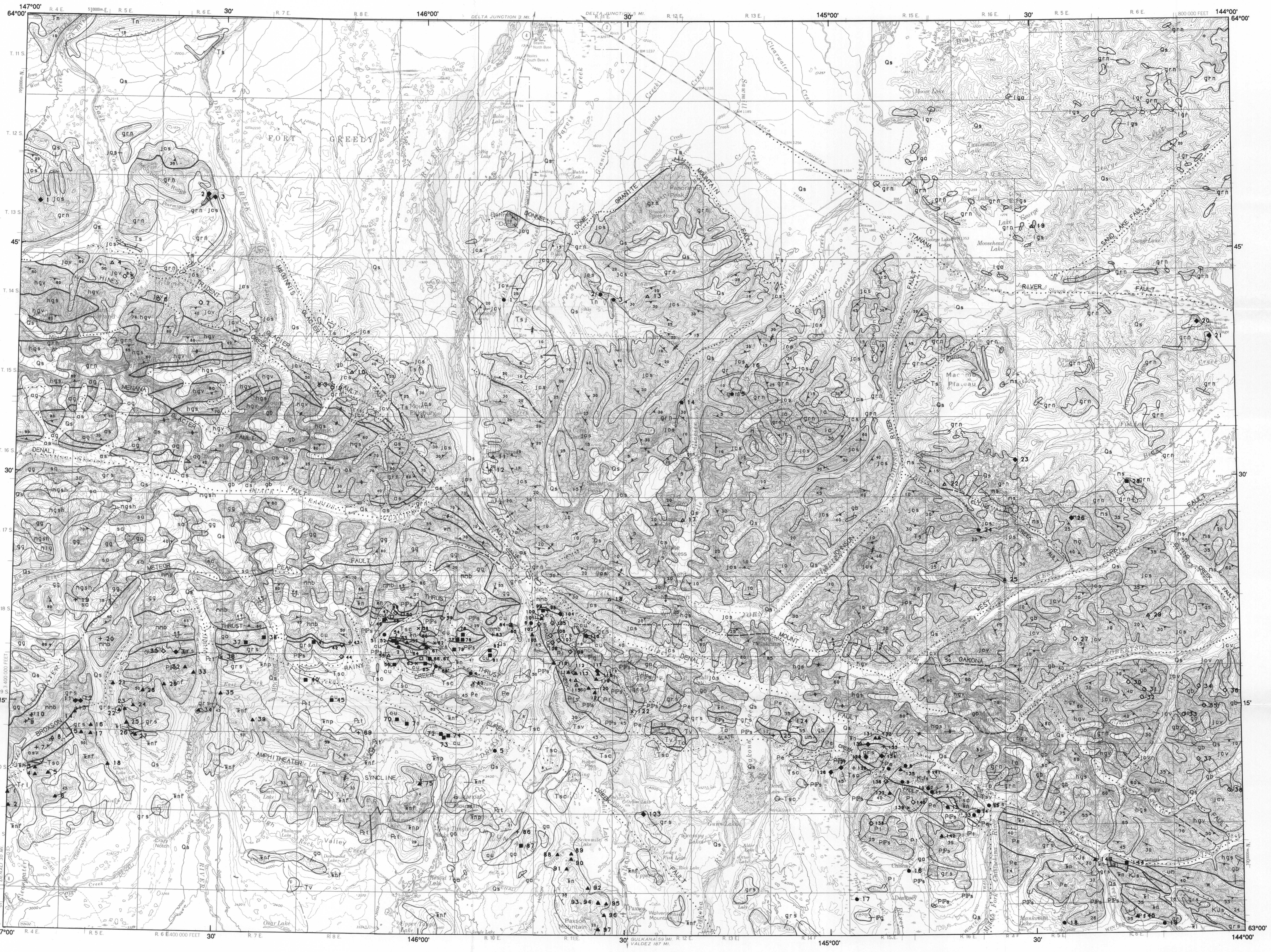

Base from U.S. Geological Survey, 1955
Universal Transverse Mercator projection

Generalized bedrock geologic map compiled by Warren J. Nokleberg from mapping by Warren J. Nokleberg, Ian M. Lange, John N. Aleinikoff, Ronny T. Miyaoka, and Richard E. Zehner, 1977–85.

Edited by Julia Thomas; prepared by Lori Moore
Manuscript approved for publication September 22, 1987

SCALE 1:250 000
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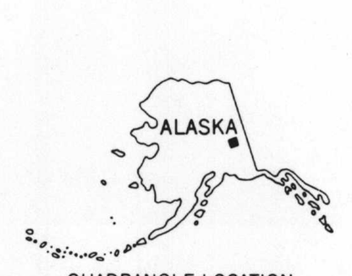
5 0 5 10 15 20 25 KILOMETERS
CONTOUR INTERVAL 200 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

EXPLANATION

Mineral deposit and occurrence symbols--Numbers refer to Tables (see accompanying pamphlet)

- ● Gold and (or) platinum placer deposit type
- ◇ Kuroko massive sulfide deposit type
- ▲ Copper-silver quartz vein deposit type
- △ Polymetallic vein deposit type
- × Tungsten-molybdenum or copper-lead-zinc skarn deposit type
- ◇ Porphyry copper deposit type
- ◆ Porphyry copper-molybdenum deposit type
- ⬟ Porphyry tin deposit type
- □ Gabbroic nickle-copper deposit type
- ■ Podiform chromite deposit type
- + Uncategorized occurrence, deposit, or prospect

DEFINITIONS

The term "mineral occurrence" is defined as a concentration of potentially valuable minerals on which no visible exploration has occurred or for which no grade and tonnage estimates have been made. Mineral occurrences were identified mainly during geologic mapping in the course of studying hydrothermally altered and (or) Fe-stained areas. The term "mineral deposit" is defined as those concentrations of potentially valuable minerals for which grade and tonnage estimates have been made. The term "prospect" is defined as a site of potentially valuable minerals in which excavation has occurred. The term "mine" is defined as a site where valuable minerals have been extracted. The term "deposit" is defined as any individual or group of lode or placer mineral occurrences, mineral deposits, prospects, and (or) mines.

DESCRIPTION OF MAP UNITS

Qs Surficial deposits (Quaternary)--Alluvium, colluvial deposits, glacial deposits, fluviolacustrine deposits, rock glacier deposits, snow and ice

SEDIMENTARY ROCKS AND METAMORPHOSED SEDIMENTARY, VOLCANIC, AND PLUTONIC ROCKS NORTH OF DENALI FAULT

Tn Nenana Gravel (late Tertiary)--Chiefly thick bedded to massive, poorly-sorted conglomerate with lesser sandstone and siltstone. Unconformably overlain by Pleistocene glacial deposits. Locally unconformably overlies the sandstone (Ts) of Oligocene to Pliocene age, and locally overlies the coal-bearing sedimentary rocks of Jarvis Creek coal field of early Tertiary age (Tsj)

Ts Sandstone (middle and early Tertiary)--Chiefly sandstone, graywacke, poorly consolidated siltstone, and mudstone. Occurs mainly in fault-bounded prisms along north edge of Alaska Range. Locally overlain by the Nenana Gravel and locally overlies the sedimentary rocks of the Jarvis Creek coal field (Tsj)

Tsj Sedimentary rocks of Jarvis Creek coal field (early Tertiary)--Chiefly conglomerate, sandstone, and coal beds. Locally overlain by the sandstone (Ts) and the Nenana Gravel (Tn)

la Lamprophyre, alkalic gabbro, and alkalic diorite (early Tertiary and Late Cretaceous)--Chiefly fine grained to medium-grained, panidiomorphic-granular aggregates of olivine, orthopyroxene, clinopyroxene, hornblende, biotite, plagioclase, and potassium-feldspar with varying amounts of groundmass. Groundmass consists of fine-grained hornblende, biotite, plagioclase, and opaques and interstitial or replacement carbonate. Local embayed phenocrysts. Occur in locally abundant dikes and sills, local small plutons, and in the igneous complex of Mount Hajdukovich in north-central part of quadrangle

m Monzonite and monzodiorite (early Tertiary and Late Cretaceous)--Chiefly fine grained to medium-grained, hypautomorphic-granular aggregates of clinopyroxene, biotite, potassium-feldspar, and plagioclase. Local white mica and carbonate alteration. Occur in moderate-size plutons in the igneous complex of Mount Hajdukovich in north-central part of quadrangle

grn Granitic plutonic rocks north of Denali fault (early Tertiary to mid-Cretaceous)--Chiefly medium grained to coarse-grained biotite-hornblende granite and hornblende-biotite granodiorite, with lesser quartz diorite and diorite. Predominant igneous rather than metamorphic textures. Occur in small dikes, stocks, and locally large plutons in the southern Yukon-Tanana, Aurora Peak, and Windy terranes. Locally weakly to moderately deformed and metamorphosed at lower greenschist facies in Macomb Plateau area. Local intense hydrothermal alteration

gb Gabbro and mafic plutonic rocks and dikes and sills (Cretaceous)--Chiefly gabbro and metagabbro with lesser hornblende diorite and diabase. Intrude the Jarvis Creek Glacier and Hayes Glacier subterranes (of the southern Yukon-Tanana terrane) and the Windy terrane. Textures in gabbro, diorite, and diabase mainly hypautomorphic-granular or ophitic aggregates of hornblende, plagioclase, and lesser biotite. Textures in metagabbro mainly schistose aggregates of actinolite, chlorite, biotite, epidote, and albite. Occur in narrow dikes to small- to moderate-size plutons. Dikes and sills generally sub-concordant to acutely crossing the intense schistosity and parallel compositional layering in wall rocks. Crosscut and intruded by Cretaceous and early Tertiary granitic rocks (grn)

SOUTHERN YUKON-TANANA TERRANE

Lake George subterrane
North of Tanana River fault

lga Augen gneiss and schist (Mississippian)--Coarse- to medium- grained augen gneiss and schist composed of gneissose aggregates of potassium feldspar, plagioclase, biotite, and quartz. Ductilely deformed and regionally metamorphosed at amphibolite facies into mylonitic gneiss and schist. Occur in moderate- to large-size, irregularly shaped, homogeneous plutons intruding gneissose granitic plutons and pelitic schist. Relict hypautomorphic-granular texture with relict potassium feldspar phenocrysts. Locally deformed and retrograded to lower greenschist facies

lgr Medium-grained gneissose granitic rocks (Devonian)--Chiefly gneissose hornblende-biotite granodiorite and lesser gneissose biotite granite. Relict hypautomorphic-granular texture. Occur in moderate- to large-size, irregularly shaped, homogeneous plutons intruding pelitic schist. Ductilely deformed and regionally metamorphosed at amphibolite facies into mylonitic gneiss. Locally deformed and retrograded to lower greenschist facies

lgs Pelitic schist and quartzite (Devonian and older)--Chiefly poly-deformed, medium- to coarse-grained pelitic muscovite-quartz-biotite- garnet schist and metaquartzite derived from quartz-rich to clay-rich shale. Ductilely deformed and regionally metamorphosed at amphibolite facies into mylonitic schist. Locally deformed and retrograded to lower greenschist facies

Macomb subterrane
South of Tanana River fault

mg Metamorphosed granitic rocks (Devonian)--Chiefly fine grained to medium-grained gneissose granite and granodiorite with lesser quartz diorite and diorite. Ductilely deformed and regionally metamorphosed into mylonitic gneiss at epidote-amphibolite facies. Form irregularly shaped plutons and dikes intruding pelitic schist, calc-schist, and quartz-feldspar schist. Locally deformed and retrograded to lower greenschist facies

ms Metamorphosed pelitic, calcareous, and quartz-feldspar sedimentary rocks (Devonian or older)--Medium-grained, poly-deformed, biotite-muscovite-quartz pelitic schist, garnet-plagioclase schist, and quartz-plagioclase-biotite schist derived from shale, marl, and sandstone. Ductilely deformed and regionally metamorphosed at epidote-amphibolite facies into fine- to medium-grained mylonitic schist. Locally deformed and retrograded to lower greenschist facies

Jarvis Creek Glacier subterrane
South of Elting Creek fault

jcg Fine- to medium-grained gneissose granitic rocks (Devonian)--Chiefly gneissose hornblende-biotite diorite and granodiorite and lesser augen gneiss or gneissose granite. Occur in small- to moderate-size, irregularly shaped, homogeneous plutons. Relict hypautomorphic-granular texture. Mainly in Donnelly Dome and benchmark Ober areas intruding pelitic schist and quartzite. Ductilely deformed and regionally metamorphosed at amphibolite facies into mylonitic gneiss and schist. Local retrogression to south to lower greenschist facies

jcv Fine-grained schistose volcanic rocks and pelitic schist (Devonian)--Chiefly polydeformed, fine-grained, schistose meta-andesite and metamorphosed quartz keratophyre with lesser metadacite, metabasalt, pelitic schist, quartzite, calc-schist, and marble. Ductilely deformed and regionally metamorphosed at greenschist facies into mylonitic schist or local phyllonite. Local intense iron staining, and disseminated and massive sulfide minerals

jcs Fine-grained metasedimentary rocks (Devonian and older)--Chiefly polydeformed, fine-grained pelitic schist and quartzite with lesser calc-schist, quartz feldspar schist and marble, and with very sparse schistose metavolcanic rocks. Metasedimentary rocks derived from shale, chert or quartz sandstone, marl, volcanic graywacke, and limestone. Ductilely deformed and regionally metamorphosed at greenschist facies into mylonitic schist or local phyllonite. Includes large areas of upper greenschist facies and lower amphibolite facies metamorphic rocks in area south of Granite Mountain and south of Donnelly Dome. Amphibolite facies minerals to the north are progressively replaced by greenschist-facies minerals to the south

Hayes Glacier subterrane
South of Hines Creek and Mount Gakona faults

hgv Fine-grained schistose volcanic rocks and phyllite (Devonian)--Chiefly polydeformed, schistose to phyllitic meta-andesite and metamorphosed quartz keratophyre, and lesser metadacite and metabasalt with locally abundant pelitic-, quartz-, and calc-phyllite. Ductilely deformed and regionally metamorphosed at lower and middle greenschist facies into phyllonite and blastomylonite. Local areas of iron staining and disseminated sulfide minerals

hgs Fine-grained schistose sedimentary rocks and volcanic rocks (Devonian or older)--Chiefly pelitic, quartz-, and calc-phyllite. In eastern part of quadrangle, chiefly polydeformed quartz-chlorite-white mica phyllite, graphitic-quartz phyllite, quartz-plagioclase phyllite, calc-phyllite, and marble. Locally meta-andesite, metamorphosed quartz keratophyre, and metadacite. In western part of quadrangle, chiefly polydeformed pelitic schist, quartz-mica schist, and lesser quartzite, and calc-schist derived from shale, quartz-siltstone and sandstone, and marble. Derived from shale, chert or quartz siltstone, volcanic graywacke, marl, and limestone. Ductilely deformed and regionally metamorphosed at lower and middle greenschist facies into phyllonite and blastomylonite

AURORA PEAK TERRANE

South of Nenana Glacier fault

ag Metamorphosed granitic rocks (Late Cretaceous)--Chiefly gneissose granodiorite and granite with lesser quartz diorite, diorite, gabbro, and amphibolite derived from gabbro and diorite. Occur in east-striking plutons and dikes intruding calc-schist, marble, quartzite, and pelitic schist. Relict hypautomorphic granular texture. Ductilely metamorphosed and penetratively deformed twice, once into mylonitic gneiss during an earlier period of upper amphibolite facies metamorphism, and later into blastomylonite during a period of middle greenschist-facies metamorphism

as Metamorphosed sedimentary rocks (Triassic to Silurian)--Chiefly polydeformed, fine- to medium- grained calc-schist, marble, quartzite, and pelitic schist. Derived from marl, quartzite, and shale. Ductilely metamorphosed and deformed twice, once into mylonitic schist during an older period of upper amphibolite facies metamorphism, and later into blastomylonite at middle greenschist facies

WINDY TERRANE

Within splays of Denali fault

wm Melange (Cretaceous, Devonian, and Silurian?)--Structural melange consisting of two assemblages: (1) small to large fault-bounded lenses of Cretaceous flysch and volcanic rocks, mainly argillite, quartz-pebble siltstone, quartz sandstone, metagraywacke, and conglomerate with lesser andesite and dacite; and (2) small to large fault-bounded lenses of limestone and marl of Silurian(?) and Devonian age. Weakly metamorphosed. Local weak schistosity. Locally intensely deformed, with development of phyllonite and protomylonite in narrow shear zones. Incipient lower greenschist-facies metamorphism. Occur in narrow, fault-bounded lenses along Denali fault

SEDIMENTARY AND VOLCANIC ROCKS AND METAMORPHOSED SEDIMENTARY, VOLCANIC, AND PLUTONIC ROCKS SOUTH OF THE DENALI FAULT

Tsc Sandstone and conglomerate (late to middle Tertiary)--Chiefly continental clastic deposits of light-colored, fine-grained, poorly sorted, sandstone with locally interbedded siltstone, pebbly sandstone, pebble to cobble conglomerate, and sparse thin coal layers, and sparse white rhyodacite ash layers south of The Hoodoos. Occurs in scattered exposures. Overlies the conglomerate unit (Tc). Generally faulted against older bedrock. Commonly occurs as fault-bounded lenses in branches of Broxson Gulch thrust, Rainy Creek thrust, and Eureka Creek fault. Unit age is considered to be Eocene to Pliocene

Tc Conglomerate (early Tertiary)--Chiefly continental clastic deposits of mainly poorly sorted, crudely bedded to massive, polymictic conglomerate and lesser sandstone. Conglomerate contains abundant clasts of rhyodacite to dacite tuff and flows, the Nikolai Greenstone, argillite, volcanic sandstone, and andesite to dacite flows of the Eagle Creek and Slana Spur Formations, quartz diorite, greenschist, gabbro, and ultramafic rocks. Local thin beds of coal in sandstone layers. Overlies the volcanic rocks unit (Tv) and older bedrock of the Slana Spur Formation (PPs). Locally faulted against older bedrock. Commonly occurs as fault- bounded lenses in branches of McCallum Creek-Slate Creek thrust. Unit age is considered to be Eocene

Tv Volcanic rocks (early Tertiary)--Chiefly ash-flow tuff, breccia, agglomerate, flows, dikes, and sills with lesser volcanic sandstone, conglomerate, and limestone, dikes, and sills. Igneous rocks chiefly rhyodacite, dacite, and andesite. Occurs in scattered outcrops. Overlain by, and locally in fault contact with the conglomerate unit (Tc) and the sandstone and conglomerate unit (Tsc). Locally faulted against older bedrock of the Slana Spur Formation (PPs). Unit age is considered to be Eocene

grs Granitic plutonic rocks south of Denali fault (Early Cretaceous and Late Jurassic)--Chiefly medium grained to coarse-grained hornblende-biotite granodiorite and biotite granite with lesser diorite and quartz diorite. Predominant texture igneous rather than metamorphic. Occur in the Maclaren, Clearwater, and Wrangellia terranes in small dikes, stocks, and moderate-size to large plutons. Weakly deformed to nonschistose. Locally weakly to extensively hydrothermally altered

TERRANE OF ULTRAMAFIC AND ASSOCIATED ROCKS

um Ultramafic and associated rocks consisting of pyroxenite, peridotite, dunite, and amphibolite (Mesozoic?)--Partly serpentinized. Includes lesser hornblende-plagioclase gneiss and minor serpentinite, marble, graphitic schist, tonalite, and granite. Earlier pervasive ductile deformation and metamorphism at amphibolite facies. Locally well defined schistosity. Later locally intensely deformed and metamorphosed to lower greenschist. Occur in narrow, fault-bounded lenses along Denali fault and in klippen south of Denali fault

MACLAREN TERRANE

North of Broxson Gulch thrust

East Susitna batholith and schist, quartzite, and amphibolite
North of Meteor Peak fault

gg Gneissose granitic rocks (early Tertiary and Late Cretaceous)--Chiefly polydeformed quartz diorite and granodiorite, with lesser granite. Relict hypautomorphic-granular texture. Regionally metamorphosed and ductilely deformed at middle amphibolite facies into mylonitic gneiss. Grade into migmatite, migmatitic schist, and schist and amphibolite. Local retrograde, lower greenschist-facies metamorphism

sa Schist and amphibolite (Late Cretaceous or older)--Hornblende- biotite-quartz-plagioclase schist and hornblende-plagioclase-quartz amphibolite. Derived from gabbro, quartz gabbro, diorite, quartz diorite, and pelitic sedimentary rocks. Relict hypautomorphic-granular texture in meta-igneous rocks. Ductilely deformed and regionally metamorphosed at middle amphibolite facies into mylonitic schist and gneiss. Local retrogressive metamorphism to greenschist facies. Relatively older and more highly metamorphosed equivalent of the gneissose granitic rocks (gg) of East Susitna batholith

mig Migmatite (Cretaceous?)--Highly contorted schist and amphibolite with abundant, diffuse, thin veins and sills of granodiorite and granite. Gradational unit between the gneissose granitic rocks unit (gg), with fragments of the nearly completely assimilated schist and amphibolite (sa), and the migmatitic schist (mgsh) units. Contorted schistosity. Contains abundant, small to large granitic dikes

mgsh Migmatitic schist (Cretaceous?)--Chiefly schist and amphibolite with sparse to moderately abundant veins of granitic rocks. Attitude of schistosity generally constant over large areas. Gradational unit between the schist and amphibolite (sa) and the migmatite (mig) units. Contains fewer sills and veins of granitic rocks than the migmatite unit (mig)

sq Schist, quartzite, and amphibolite (Triassic?)--Chiefly calc-silicate schist, para-amphibolite, and quartzite. Ductilely deformed and regionally metamorphosed at amphibolite facies into mylonitic schist. Intruded by the gneissose granitic rocks unit (gg)

Maclaren Glacier metamorphic belt
South of Meteor Peak fault

mmb Schist and amphibolite, phyllite, and argillite and metagraywacke (Late Jurassic or older)--Mainly faulted sequence. Metamorphic grade systematically increases from lower greenschist facies in the south to middle amphibolite facies to the north. Ductilely deformed into protomylonite and phyllonite in the argillite and metagraywacke part of unit, phyllonite in the phyllite part of unit, and mylonitic schist in the schist and amphibolite part of unit. Occur as fault-bounded units south of Meteor Peak fault and north of Broxson Gulch thrust. Argillite and metagraywacke part of unit mainly derived from volcanic graywacke and siltstone and minor andesite and basalt with lesser calcareous and quartz siltstone

CLEARWATER TERRANE

Within splays of Broxson Gulch thrust

csv Schistose metasedimentary and metavolcanic rocks (Late Triassic)--Chlorite schist, muscovite schist, and marble. Lesser schistose metarhyolite and metarhyodacite flows, and greenstone derived from pillow basalt. Weakly deformed and metamorphosed at greenschist facies. Intensely deformed at faults between units in some areas

WRANGELLIA TERRANE

South of Broxson Gulch thrust

JTRm McCarthy Formation (Early Jurassic and Late Triassic)--Thin- to medium-bedded calcareous argillite and impure limestone with abundant *Monotis*. Occurs in branches of Broxson Gulch thrust

ga Gabbro, diabase, and metagabbro (Late Triassic?)--Small, irregular bodies, dikes, and sills of medium- to coarse-grained gabbro and fine- to medium-grained diabase and locally schistose metagabbro that occur throughout the Wrangellia terrane. Gabbro and diabase range from hypautomorphic-granular or ophitic aggregates of clinopyroxene, plagioclase and lesser biotite, to regionally metamorphosed metagabbro composed of schistose aggregates of hornblende or actinolite, chlorite, biotite, epidote, and albite. In some areas, may be late Paleozoic in age and part of igneous suite in the Slana Spur Formation and the Tetelna Volcanics

cu Cumulate mafic and ultramafic rocks (Late Triassic?)--Moderate- size to large sills of olivine, olivine-clinopyroxene, and clinopyroxene-plagioclase cumulate. Partly to mostly serpentinized. Locally intensely deformed into serpentinite, actinolite-chlorite schist, or talc schist. Occur as large sills in the Tangle subterrane, and as fault-bounded lenses in the Slana River subterrane

Slana River subterrane
South of Broxson Gulch thrust
and north of Eureka Creek fault

KJs Marine sedimentary rocks (Early Cretaceous and Late Jurassic)--Interlayered gray argillite, siltstone, graywacke, pebble conglomerate, and andesite. Abundant graded and rhythmic bedding, sole marks, and slump folds in some areas. Interpreted as deep-marine turbidite deposits. Locally isoclinally folded. Weakly metamorphosed to lower greenschist facies

TRl Limestone (Late Triassic)--Fine-grained gray limestone to medium-grained gray or white marble. Lenses and nodules of gray and black chert and irregular patchworks of disseminated fine-grained quartz. Thick bedded to massive. Weakly schistose. Pervasively recrystallized. Locally faulted and sheared. Locally faulted into the subjacent Nikolai Greenstone. Locally metasomatized to skarn near granitic plutons

TRn Nikolai Greenstone (Late Triassic)--Subaerial, amydgaloidal basalt flows separated by thin beds of nonmarine volcaniclastic rocks, chert, and argillite in some areas. Predominantly intermixed aa and pahoehoe flows. Individual flows up to several meters thick. Usually ophitic or hypautomorphic-granular with clinopyroxene, plagioclase, and magnetite. Generally regionally metamorphosed and locally schistose with locally abundant metamorphic actinolite, epidote, chlorite, albite, and sericite. Quartz veins and altered zones areas with Cu-sulfide minerals in some areas

Pe Eagle Creek Formation (Early Permian)--Argillite and limestone. Argillite--dark gray and thin bedded and local calcareous siltstone and thin limestone. Limestone--thin bedded to massive and light to dark gray with thin argillite interbeds. Chert nodules and thin layers of chert, volcanic graywacke, and clastic limestone in some areas. Local grading and crossbedding. Weakly metamorphosed to lower greenschist facies. Locally intensely metamorphosed in some areas near Denali fault

Pi Shallow-level intrusive stocks, dikes, sills, and small plutons (Early Permian)--Small- to moderate-size intrusive stocks, dikes, and sills. Mainly dacite with lesser andesite, rhyodacite, and diabase, generally fine grained. Local small plutons of granodiorite and granite. Porphyritic with relict plagioclase phenocrysts in some areas. Weakly schistose in some areas. Weakly metamorphosed to lower greenschist facies. Local intense hydrothermal alteration with replacement of igneous minerals by sericite, chlorite, epidote, actinolite, albite, potassium-feldspar, and clay. Local iron staining and disseminated sulfide minerals

IPg Granitic plutons south of the Denali fault (Pennsylvanian)--Chiefly medium grained to coarse-grained hornblende-biotite granodiorite and biotite granite with lesser diorite and quartz diorite. Occur in moderate-size and large plutons. Weakly-deformed to non-schistose

PIPs Slana Spur Formation (Early Permian to Middle Pennsylvanian)--Thick sequence of marine calcareous (upper part) and noncalcareous (lower part) volcaniclastic rocks, and lesser volcanic sandstone, conglomerate, tuff, volcanic breccia and flows, and limestone. Fine to coarse grained. Volcanic rocks generally dacite and lesser andesite, rhyodacite, and basalt. Medium to thick bedded. Locally graded and crossbedded. Weakly schistose to massive. Pervasively metamorphosed to lower greenschist facies. Local abundant iron staining. Disseminated and massive sulfide minerals

IPt Tetelna Volcanics (Pennsylvanian)--Chiefly dark greenish gray andesite and dacite flows, with sparse basalt flows and local volcanic breccia, volcanic graywacke, conglomerate, and tuff. Fine to coarse grained. Thin to thick bedded. Weakly schistose to massive. Pervasively metamorphosed to lower greenschist facies. Local abundant iron staining. Disseminated sulfide minerals

Tangle subterrane
South of Eureka Creek fault

TRl Limestone (Late Triassic)--Fine-grained gray limestone to medium-grained gray or white marble. Thick bedded to massive. Weakly schistose. Pervasively recrystallized. Occurs in fault-bounded lenses adjacent to the Nikolai Greenstone. Locally faulted and sheared. Locally metasomatized to skarn near granitic plutons

Nikolai Greenstone (Late Triassic)--Divided into:

TRnf Subaerial basalt flows and minor associated shale, chert, and siltstone member of the Nikolai Greenstone (Late Triassi)]--Subaerial, amydgaloidal basalt flows separated locally by thin beds of nonmarine volcaniclastic rocks and local thin beds of shale, chert, and siltstone. Predominantly intermixed aa and pahoehoe flows. Individual flows as much as a few meters thick. Common ophitic texture or hypautomorphic-granular texture with clinopyroxene, plagioclase, and magnetite. Generally regionally metamorphosed and locally schistose with abundant metamorphic actinolite, epidote, chlorite, albite, and sericite. Similar to the Nikolai Greenstone in the Slana River subterrane. Local quartz veins and altered areas with Cu-sulfide minerals

TRnp Pillow basalt flows [member of the Nikolai Greenstone (Late Triassic)--Massive pillow basalt flows, and minor basaltic breccia and tuff, and argillite. Basalt similar to subaerial basalt flows of the Nikolai Greenstone. Weakly schistose to massive. Generally regionally metamorphosed with abundant metamorphic actinolite, epidote, chlorite, albite, and sericite. Local quartz veins and altered areas including Cu-sulfide minerals

Pzt Aquagene tuff, argillite, limestone, chert, andesite tuff, and greenstone (late Paleozoic)--Interlayered basaltic aquagene tuff, gray siliceous argillite, calcite limestone, and marble, red and black chert, and gray-green tuff and basalt. Medium to thick bedded. Weakly schistose to massive. Pervasively metamorphosed to lower greenschist facies

Contact--Dotted where concealed

Fault--Dashed where approximately located; dotted where concealed

Anticline or antiform--Dashed where approximately located; dotted where concealed; showing direction of plunge

Overturned antiform--Showing direction of dip of limbs; dotted where concealed

Syncline or synform--Showing direction of plunge where known; dashed where approximately located; dotted where concealed

Strike and dip of beds
- 60 Inclined
- Vertical

Strike and dip of schistosity
- 50 Inclined
- Vertical

CORRELATION OF MAP UNITS

Qs — QUATERNARY
Unconformity

SEDIMENTARY ROCKS AND METAMORPHOSED SEDIMENTARY, VOLCANIC, AND PLUTONIC ROCKS NORTH OF DENALI FAULT

Unit	Age
Tn	LATE TERTIARY
Ts	MIDDLE AND EARLY TERTIARY
Tsj	EARLY TERTIARY
Unconformity	
la, m	EARLY TERTIARY AND LATE CRETACEOUS
grn	EARLY TERTIARY TO MID-CRETACEOUS
gb	CRETACEOUS

SOUTHERN YUKON-TANANA TERRANE

Lake George subterrane
North of Tanana River fault

Unit	Age
lga	MISSISSIPPIAN
lgr	DEVONIAN
Intrusive contact	
lgs	DEVONIAN AND OLDER

Macomb subterrane
South of Tanana River fault

Unit	Age
mg	DEVONIAN
Intrusive contact	
ms	DEVONIAN OR OLDER

Jarvis Creek Glacier subterrane
South of Elting Creek fault

Unit	Age
jcg	DEVONIAN
Intrusive contact	
jcv	DEVONIAN
jcs	DEVONIAN AND OLDER

Hayes Glacier subterrane
South of Hines Creek and Mount Gakona faults

Unit	Age
hgv	DEVONIAN
hgs	DEVONIAN OR OLDER

AURORA PEAK TERRANE
South of Nenana Glacier fault

Unit	Age
ag	LATE CRETACEOUS
Intrusive contact	
as	TRIASSIC TO SILURIAN

WINDY TERRANE
Within splays of Denali fault

Unit	Age
wm	CRETACEOUS DEVONIAN, AND SILURIAN (?)

Denali fault

SEDIMENTARY AND VOLCANIC ROCKS AND METAMORPHOSED SEDIMENTARY, VOLCANIC, AND PLUTONIC ROCKS SOUTH OF THE DENALI FAULT

Unit	Age
Tsc	LATE TO MIDDLE TERTIARY
Tc	EARLY TERTIARY
Tv	EARLY TERTIARY
Unconformity	
grs	EARLY CRETACEOUS AND LATE JURASSIC

TERRANE OF ULTRAMAFIC AND ASSOCIATED ROCKS

Unit	Age
um	MESOZOIC(?)

MACLAREN TERRANE
North of Broxson Gulch thrust

East Susitna batholith and schist, quartzite, and amphibolite
North of Meteor Peak fault

Unit	Age
gg	EARLY TERTIARY AND LATE CRETACEOUS
sa	LATE CRETACEOUS OR OLDER
mig, mgsh	CRETACEOUS(?)
Intrusive contact	
sq	TRIASSIC(?)

Maclaren Glacier metamorphic belt
South of Meteor Peak fault

Unit	Age
mmb	LATE JURASSIC OR OLDER

CLEARWATER TERRANE
Within splays of Broxson Gulch thrust

Unit	Age
csv	LATE TRIASSIC

WRANGELLIA TERRANE
South of Broxson Gulch thrust

Unit	Age
JTRm	EARLY JURASSIC AND LATE TRIASSIC
Fault	
ga	LATE TRIASSIC(?)
cu	LATE TRIASSIC(?)
Intrusive contact	

Slana River subterrane
South of Broxson Gulch thrust
and north of Eureka Creek fault

Unit	Age
KJs	EARLY CRETACEOUS AND LATE JURASSIC
Disconformity	
TRl, TRn	LATE TRIASSIC
Disconformity	
Pe	EARLY PERMIAN
Pi	EARLY PERMIAN
Intrusive contact	
IPg	PENNSYLVANIAN
Intrusive contact	
PIPs	EARLY PERMIAN TO MIDDLE PENNSYLVANIAN
IPt	PENNSYLVANIAN

Tangle subterrane
South of Eureka Creek fault

Unit	Age
TRl, TRnf, TRnp	LATE TRIASSIC
Disconformity	
Pzt	LATE PALEOZOIC

MAP SHOWING LOCATIONS OF METALLIFEROUS LODE AND PLACER MINERAL OCCURRENCES, MINERAL DEPOSITS, PROSPECTS, AND MINES, MOUNT HAYES QUADRANGLE, EASTERN ALASKA RANGE, ALASKA

By

Warren J. Nokleberg, Ian M. Lange, Robert C. Roback, Warren Yeend, and Steven R. Silva

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